

FINAL TECHNICAL/SCIENTIFIC REPORT

Award Number: DE- EE0002500.000

Recipient: Forest County Potawatomi Community

Project Title: Replacement of Lighting Fixtures with LED Energy Efficient Lights at the Parking Facility, Milwaukee, Wisconsin

Project Location: Potawatomi Bingo Casino Parking Facility, Milwaukee, WI

Principal Investigator: David Brien, Facilities Director and James Borgealt, Electrical Services Manager

EXECUTIVE SUMMARY

The original scope of this project was to replace all the 1,720 205-Watt Metal Halide-type lights at the Forest County Potawatomi Community's (the "FCPC" or "Tribe") parking facilities located at the Potawatomi Milwaukee Bingo Casino, Milwaukee, Wisconsin, with state-of-the-art, energy efficient 55-Watt LED lights. The Tribe owns a six-story parking structure adjacent to its Milwaukee Potawatomi Bingo Casino operation (the "Casino") and a valet parking facility that is located under the Casino (collectively the "Parking Facilities"). Starting on August 30, 2010, the Tribe replaced a total 1,760 light fixtures in the Parking Facilities, 40 more fixtures than originally proposed, in two stages: first 1,664 lighting fixtures in the parking ramp areas of the 6-story structure and the valet parking area were replaced; then an additional 96 fixtures were replaced in the parking structure stairwells.

The energy efficiency objective of this project is to reduce the total electrical energy demand in the Parking Facilities by approximately 50% by upgrading the lighting fixtures. For safety reasons, most of the Parking Facility's lights are operated 24 hours per day, 7 days per week. Because of this safety requirement, lighting is the primary energy demand for the Parking Facilities. The Tribe tracks its energy use on a quarterly basis, and in the year preceding implementation of this project (July 1, 2009 to June 30, 2010) the total annual electrical load for the Parking Facilities was 4,216,000 kilowatt hours ("kWh").

Implementation of the project has resulted in an immediate average reduction in monthly peak demand of 238 kW over the fourth quarter of 2010. Seasonal variability makes the total annual reduction in electrical energy use hard to predict accurately at this time. Based on all 1,760 fixtures operating 24 hours per day, the energy savings would project to be 2,313,000 kWh per year. However, as an energy saving feature, the Casino already operates the fixtures located towards the periphery of the parking ramps and on the ramps' roofs only during night time. This energy saving feature, already implemented at the Parking Facilities, will lower the net reduction in electrical energy resulting from this project. The average reduction in monthly peak demand from October 1 through December 31, 2010 translates into a forecast annual electrical energy reduction of approximately 1,995,000 kWh or 47.3% of the pre-project demand. The Tribe will continue to track its energy use at the Parking Facilities through 2011 allowing the Tribe to calculate the actual on-going electrical energy savings at the Parking Facilities that result from this project.

This project was technically effective and economically feasible and beneficial to the public not only in terms of long-term energy efficiency and associated emissions reductions, but in the short-term jobs provided for the S.E. Wisconsin region. The project was implemented, from approval by U.S. Department of Energy ("DOE") to completion, in less than 6 months. The project utilized off-the-shelf

proven technologies that were fabricated locally and installed by local trade contractors. The results have been immediate (refer to Exhibit A). Already, results indicate that the project has reduced daily baseload electrical demand at this facility by almost one-quarter megawatt ("MW"). This means that there has been a direct reduction in baseload demand in S.E. Wisconsin as a result of this project. That baseload power is mostly supplied by coal-burning utility power plants so this reduction of one-quarter MW of demand equates to significant reductions in greenhouse gas emissions and emissions of other criteria pollutants such as nitrogen oxides, sulfur oxides, and mercury. Moreover, this project will likely result in an overall reduction in peak demand when combined with the use of day lighting by the Tribe of approximately 350 kW in the summer months. In addition, as is discussed below, this project and its beneficial results have been publicized in the Milwaukee press, at the DOE annual Tribal Energy Program Review, and on the Tribe's educational global warming web site.

COMPARISON OF THE ACTUAL ACCOMPLISHMENTS WITH THE GOALS AND OBJECTIVES OF THE PROJECT

Project Goals and Objectives. The objective of this project is to reduce the electricity demand in the Parking Facilities by upgrading the lighting over a proposed 6-month project period. The Statement Of Project Objectives ("SOPO") identifies that the Tribe's goal was to replace a total of 1,720 205-Watt Metal Halide-type lights with state-of-the-art, energy efficient 55-Watt LED lights. This activity was expected to result in a maximum annual reduction in energy demand of approximately 2,260,080 kWh or 7,714 MMBtu translating into annual reductions of approximately 1,912 tons of annual CO2 emissions based on the average carbon footprint of electrical energy in Wisconsin for 2007. Another objective for the Tribe was for this project to demonstrate the Tribe's continued leadership in implementing energy efficiency projects at its government and commercial facilities. This project was anticipated to be the largest LED lighting upgrade that has been completed in the Greater Milwaukee Area and the Tribe plans to highlight this significant energy-efficiency project to the almost 6 million annual visitors to the Casino as well as to tribes with similar facilities.

Project Accomplishments. The Tribe initiated this project on July 26, 2010 and all fixtures were replaced by November 5, 2010, including 40 additional fixtures not anticipated in its original proposal. Therefore, the Tribe accomplished replacement of all the fixtures in just over 3 months, significantly faster than anticipated.

Energy savings accomplishments, based on electricity usage data from October 1 through December 31, 2010, indicate that the project has caused a total average reduction in peak demand of 238 kW. This is derived from an average 219 kW reduction in monthly peak electricity demand at the Casino parking structure and an additional 19 kW reduction at the valet parking area. Figures 1-3 provide a summary of monthly electrical use and savings at the parking structure for 2009 and 2010 with projections through December 2011. It is important to note that the metered energy use depicted in Figures 1-3 does not include electrical use in the valet parking area which is metered separately from the parking structure.

The reduction in demand outlined above translates into a projected annual savings of 1,994,623 kWh for the project or 47.3% of the pre-project electrical demand for the Parking Facilities. These savings are equivalent to a reduction of 1,850 tons of annual CO2 emissions based on the average carbon footprint of electrical energy in Wisconsin. However, the actual CO2 emissions reduction is likely much higher because the electrical energy for 24-hour lighting is likely derived from a significantly higher proportion of baseload operating plants which, in Wisconsin, are mostly coal-burning facilities. The actual CO2 emissions reductions could be as high as 2,290 tons per year. In addition, the reduction in use of electricity from coal-burning utility plants will result in significant reductions in emissions of criteria pollutants such as nitrogen oxides, sulfur oxides, and mercury.

Lastly, this project has already garnered publicity for the Tribe's leadership in promoting energy efficiency projects. The project was featured in a September 12, 2010 article in the *Milwaukee Journal Sentinel* that recognized the assistance of the DOE in bringing this project to fruition. Another article in the *Milwaukee Business Journal* highlights how the Parking Facilities' lighting project is a component of the Tribe's overall efforts to increase its energy efficiency at the Casino.¹ The Tribe has also written about this Project in its internal employee news letter and its 20th anniversary publication outlining the Casino's Social Responsibility activities. All media reports that mention the Parking Facilities project are provided in Exhibit B.

In addition, Mr. David Brien, Director of Facilities, attended DOE's annual Tribal Energy Program Review in Golden, Colorado on October 25-28, 2010 on behalf of the Tribe and presented preliminary results from implementation of the project.

PROJECT SUMMARY

The Tribe initiated this project on July 26, 2010 by issuing a contract to its electrical contractor, Uihlein Electric Co., Inc. ("Uihlein"), to remove and recycle the existing lighting fixtures and to install 1,720 new Beta 55-watt LED fixtures. Uihlein mobilized to the project job site on August 30, 2010 and proceeded to first replace fixtures in the 5th, 4th, and 3rd floors of the east parking ramp. Uihlein then proceeded to replace the lighting fixtures in the belowground valet parking area, followed by the 2nd and 1st levels of the east parking ramp. Uihlein then installed the fixtures in each ramp floor of the west parking ramp starting on level 5 and working down to finish on the 1st level. All fixtures were replaced in the parking ramp areas and Uihlein completed the first demobilization from the site by September 30, 2010.

However, in the process of installing the new 55-Watt Beta LED light fixtures, the Tribe identified that parking ramps at the Parking Facilities only contained 1,664 light fixtures rather than the 1,720 originally anticipated in the proposal leaving 56 light fixtures unused. Therefore, on October 20, the Tribe amended Uihlein's contract to include replacing lighting in the eight stairwells of the six-story parking structure. There are a total of 96 lights in the stairwells, so this required amending Uihlein's contract to add 40 fixtures, bringing the total to be replaced to 1,760. The cost of installation of the additional fixtures was borne by the Tribe. All fixtures were replaced and Uihlein completed demobilizing from the site by November 5, 2010. See Exhibit C for photographs of the Parking Facility with the new lights installed.

PRODUCTS DEVELOPED

This project's scope did not include development of products such as publications, web sites, or inventions.² Nor did this project develop new techniques or research collaboration. However, as discussed above, the project gained significant publicity in local papers during implementation. In addition, the Tribe is currently developing an Internet site that will focus on information and education about issues relating to energy efficiency, renewable energy, and global warming in Wisconsin. In addition to the Tribe's outreach efforts, this project is an extension of the on-going collaboration between

¹ See, <http://www.bizjournals.com/milwaukee/stories/2009/12/21/focus1.html>. Note that this article contains some factual errors regarding funding for the Parking Facilities lighting project in that the article implies that the federal funding source was from so called stimulus money and that the funding amount was \$1.2 million.

² In fact, in a February 17, 2011 e-mail to Mr. Doug Huck, FCPC Legal Department, the DOE Project Manager, Lizana Pierce recognized that this project "does not involve any R&D patent or intellectual property concerns" and that only copyright requirements under 10 C.F.R. 600.234 applies. As such, Ms. Pierce indicated that the Tribe was not required to submit form DOE F 2050-11 "Patent Certification" on close out of the grant.

Wisconsin Focus on Energy and the Tribe in identifying and implementing potential energy efficiency projects at the Casino and in the Tribe's other government and commercial facilities.

In addition, the presentation provided by Mr. Brien at DOE's annual Tribal Energy Program Review in Golden, Colorado on October 25-28, 2010 is available online at DOE's Energy Efficiency and Renewable Energy web site.³

6024999_3

³ See, http://apps1.eere.energy.gov/tribalenergy/pdfs/38_%20pdm_potawatomi_casino.pdf.